Do No Harm: Mitigating Risk Factors for Ventilator Associated and Non-Ventilator Associated Pneumonia

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Disclosures

- Consultant-Michigan Hospital Association Keystone Center
- Consultant/Faculty for CUSP for MVP—AHRQ funded national study
- Subject matter expert for CAUTI, CALBSI, CDI, Sepsis, HAPI and culture of Safety for HIIN/CMS
- Consultant and speaker bureau for Sage Products, a business unit of Stryker
- Consultant and speaker bureau for Eloquest Healthcare

Objectives

- Identify the importance for addressing both VAP and non-vent pneumonia
- Define key evidence based nursing care practices that reduce VAP & non-vent HAP
- Discuss strategies to overcome barriers

Notes on Hospitals: 1859

- "It may seem a strange principle to enunciate as the very first requirement in a Hospital that it should do the sick no harm."

  - Florence Nightingale

Advocacy = Safety

Protect The Patient From Bad Things Happening on Your Watch

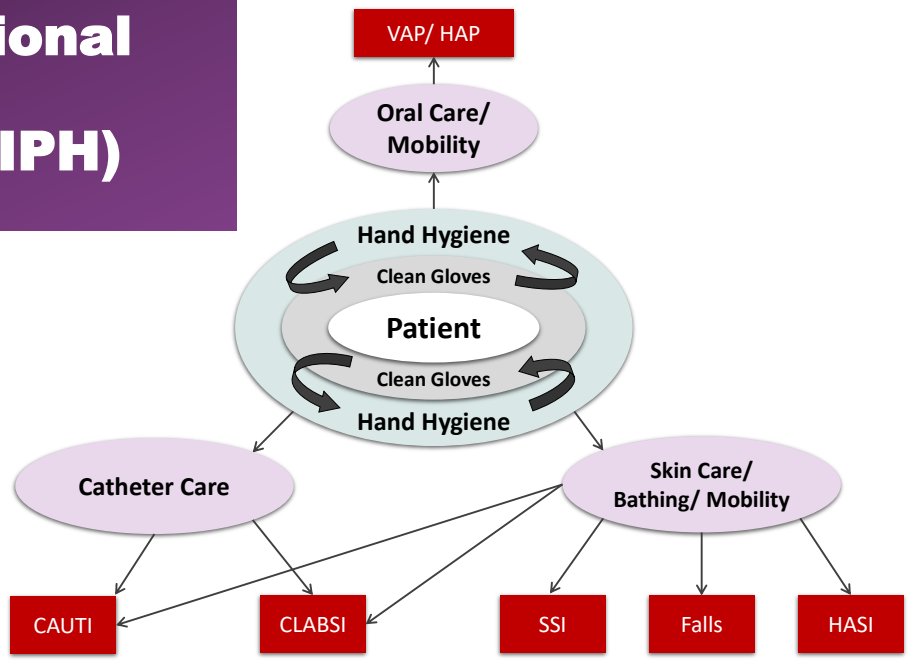
Implement Interventional Patient Hygiene

Interventional Patient Hygiene

- Hygiene…the science and practice of the establishment and maintenance of health
- Interventional Patient Hygiene….nursing action plan directly focused on fortifying the patient's host defense through proactive use of evidence-based hygiene care strategies

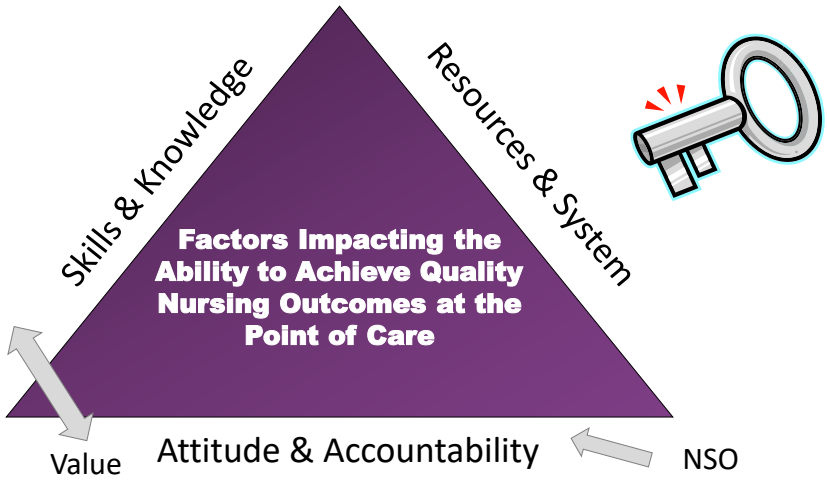
Hand Hygiene	Comprehensive Oral Care Plan	Incontinence-Associated Dermatitis Prevention Program	Bathing & Assessment	Pressure Injury Risk Reduction	Catheter Care

Interventional Patient Hygiene (IPH)



Vollman KM. Intensive Crit Care Nurs, 2013;22(4): 152-154

Achieving the Use of the Evidence



Vollman KM. Intensive Crit Care Nurs, 2013;22(4): 152-154

The Why

VAP

- VAP is associated with ↑ MV days and ↑ ICU & hospital LOS
- Attributable mortality estimated to be 4.0–13.5%
- Financial cost of a VAP episode has been estimated as approximately $20,000 to $40,000

Wallace FA, et al. Anesthesia 2015, 70, 1274-1280

Building Blocks to Best Practice in Caring for Mechanically Ventilated Patients

Ventilator Bundle: HOB 30, Deep Vein Thrombosis (DVT) prophylaxis, Peptic Ulcer Disease (PUD) prophylaxis, Sedation interruption, Spontaneous breathing trial, daily care with chlorhexidine

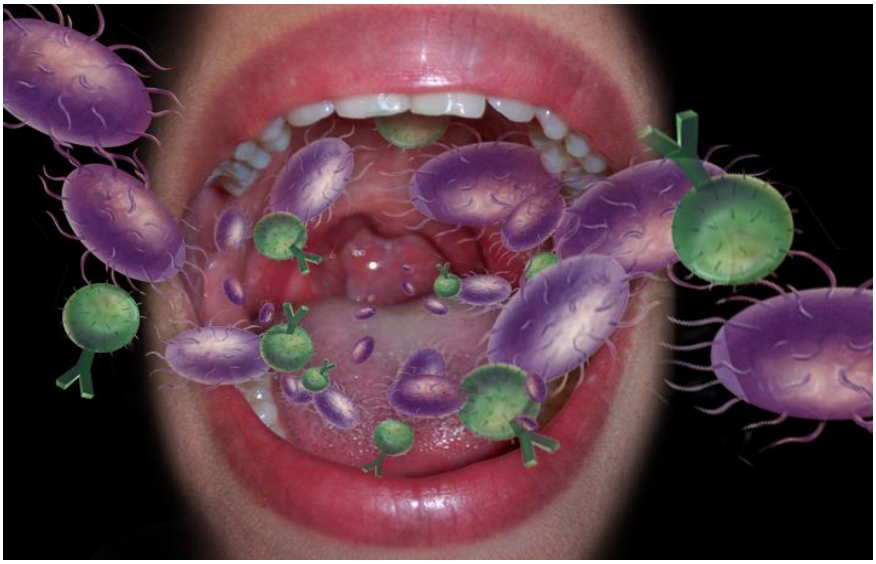
VAP Bundle: HOB 30, Sedation interruption, Spontaneous breathing trial, oral care 6x per day, CHG rinse 2x per day, subglottic secretions drainage if expected to be ventilated > 72hrs

http://www.ihi.org/resources/Pages/Tools/HowtoGuidePreventVAP.aspx www.ICUliberation.org

Risk Factor Categories for Hospital Acquired Pneumonia

- Factors that increase bacterial burden or colonization
- Factors that increase risk of aspiration

Comprehensive Oral Care



Oral Cavity & VAP

- 89 critically ill patients
- Examined microbial colonization of the oropharynx throughout ICU stay
- Used pulse field gel electrophoresis to compare chromosomal DNA
- Results:
  - Diagnosed 31 VAPs
  - 28 of 31 VAPs the causative organism was identical via DNA analysis

- 49 elderly nursing home residents admitted to the hospital
- Examined baseline dental plaque scores & microorganism within dental plaque
- Used pulse field gel electrophoresis to compare chromosomal DNA
- Results
  - 14/49 adults developed pneumonia
  - 10 of 14 pneumonias, the causative organism was identical via DNA analysis

Garrouste-Orgeas et. al. Am J Respir Crit Care Med. 1997;156:1647-1655
El-Solh AA. Chest. 2004;126:1575-1582

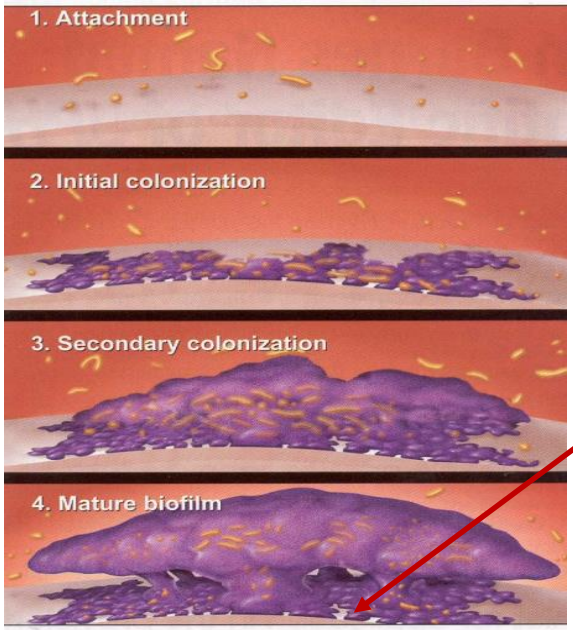


Figure 7. The Pattern of Biofilm Development. The stages of biofilm maturation are: attachment, initial colonization, secor ary colonization, and mature biofilm.

This attachment structure requires mechanical removal with a good toothbrush

Dental Plaque Biofilms By Jill S. Nield-Gehrig, RDH, MA http://www.2ndchance.info/bones-Nield-Gehrig2003.pdf

What Does the Evidence Tell Us?

- Brush
- CHG rinse alone
- CHG rinse in combination
- Swab/Clean/Moisturize
- Suction

All of the above

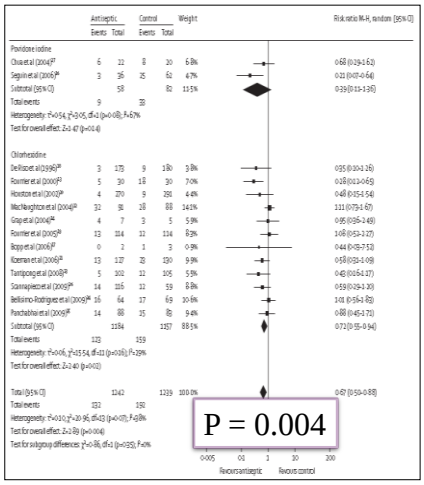
Comprehensive Oral Care Program

Literature Review: Oral Care Impact of VAP

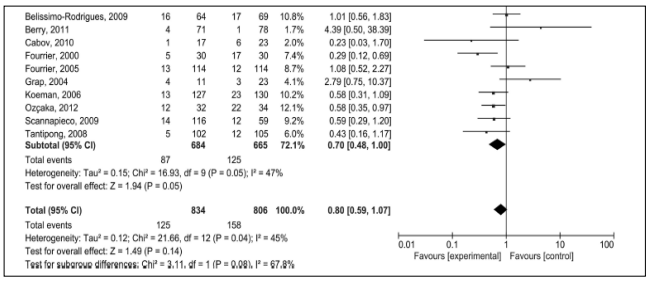
Comprehensive Oral Care:

- Reduction in VAP from 5.6 to 2.2 (Schleder B. et al. J Advocate Health 2002;4(1):27-30)
- Reduction in VAP from 4.10 (2005) to 2.15 (2006) with addition of CPC & comprehensive oral care. Vent bundle & rotational therapy already being performed
- Reduction in VAP from 12.0 to 8.0 (p=.060) with 80% compliance, vent bundle already being preformed, 1538 patients randomized to control or study group. Additional outcomes: vent days (p=.05), ICU LOS (p=.05), time to VAP (p= <.001), & reduction in mortality (p=.05) (Garcia R et al AJCC, 2009;18:523-534)

Risk Reduction of VAP with Oral Antisepsis: A Systematic Review & Meta-analysis



Labaeu SO, et.al. Lancet. 2011;11:845-854



Villar CC, Respiratory Care,2016 Sep;61(9):1245-59.

Impact of Oral CHG on Frequency of VAP

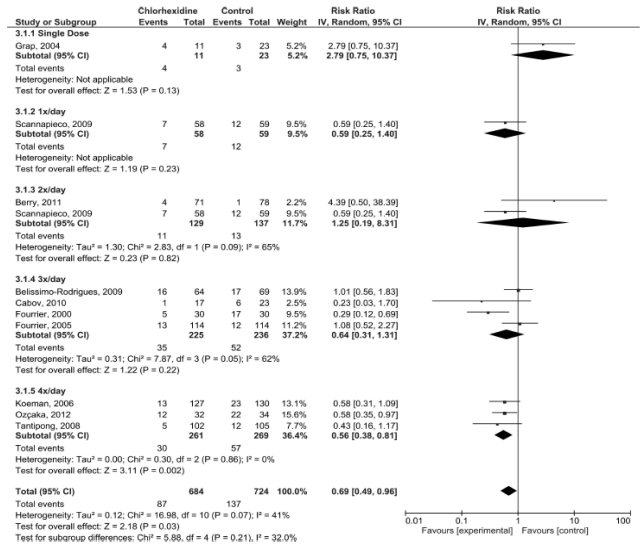


Fig. 4. Effect of chlorhexidine frequency of use on ventilator-associated pneumonia prevention.

Villar CC, Respiratory Care,2016 Sep;61(9):1245-59.

Literature Review: Oral Care Impact of VAP

Comprehensive Oral Care & CHG:

- Reduction in VAP to zero for 2 years, vent bundle, mobility, oral care & CHG with comprehensive education preformed (Murray TM et al. AACN Advanced Critical Care. 2007;18(2):190-199)

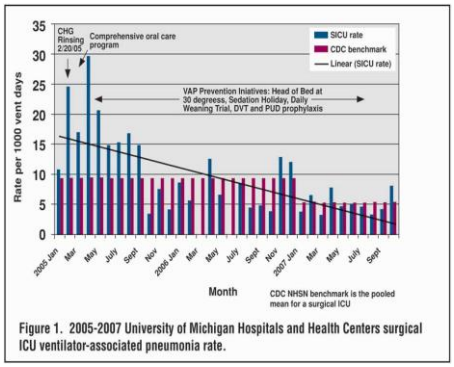
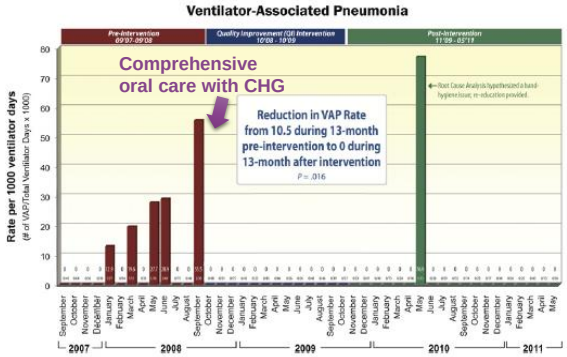


Figure 1. 2005-2007 University of Michigan Hospitals and Health Centers surgical ICU ventilator-associated pneumonia rate.

Dickinson S et al. SCCM Critical Connections, 02/2008



Heck K, et al. American Journal of Infection Control 40 (2012) 877-9

Type of Oral Care Impacted on VAP

- Multi-center prospective RCT (6 month trial)
- 1716 admitted to the ICUs; 219 fulfilled the criteria for inclusion and 213 were analyzed
- 108 were randomized to control group and 105 to intervention group (Tooth brushing with 0.12% CHG or 0.12% CHG alone q 12 hrs)
- Examine impact on VAP, time on vent & LOS

Events	Control group ($n = 108$)	Intervention group ($n = 105$)	RR	CI(95%)	P value
VAP					
No	80 (47,6%)	88 (52,4%)	1,0	-	-
Yes	28 (62,2%)	17 (37,8%)	1,81	0,93 – 3,57	0,084
Death					
No	81 (48,8%)	85 (51,2%)	1,0	-	-
Yes	27 (57,5%)	20 (42,5%)	1,41	0,73 – 2,70	0,296
Duration of mechanical ventilation[b]					
Mean ± sd	11,1 ± 7,6	8,7 ± 5,0	1,063	1,011 – 1,120	0,018[a]
Categorization[c]					
Up to 5 days	13 (37,1%)	22 (62,9%)	1,0	-	-
6 to 10 days	40 (48,8%)	42 (41,2%)	1,61	0,71 – 3,70	0,249
11 days and more	28 (57,1%)	21 (42,9%)	2,27	0,93 – 5,55	0,073
Length of ICU[b]					
Mean ± sd	13,9 ± 8,6	11,9 ± 7,77	1,032	0,999 – 1,065	0,064
Categorization[d]					
Up to 5 days				-	-
6 to 10 days				0,64 – 3,70	0,333
11 days and more				0,78 – 4,34	0,164

RR of Death 41% > in Control Group

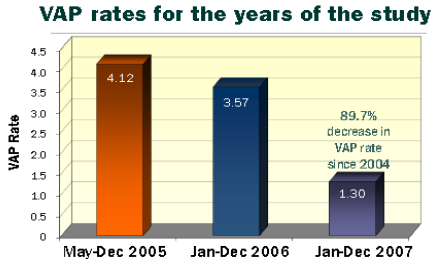
Vidal CF, et. al. BMC Infectious Diseases (2017) 17:112

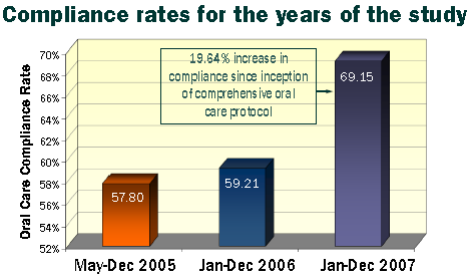
It is Not Just About the Oral CHG

It is about Manual Cleaning and Frequency of oral care

Does Compliance Make A Difference?

Oral care compliance & use of the ventilator bundle resulted in a 89.7% reduction in VAP

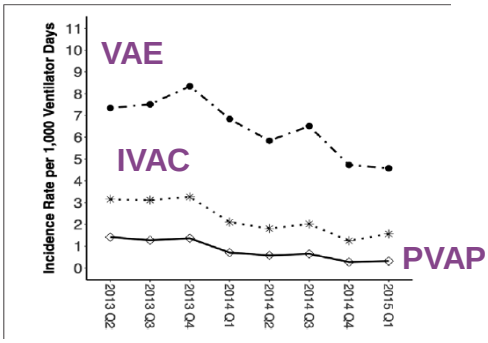




Hutchins K, et al. Amer J of Infect Control. 2009;37(7):590-597.

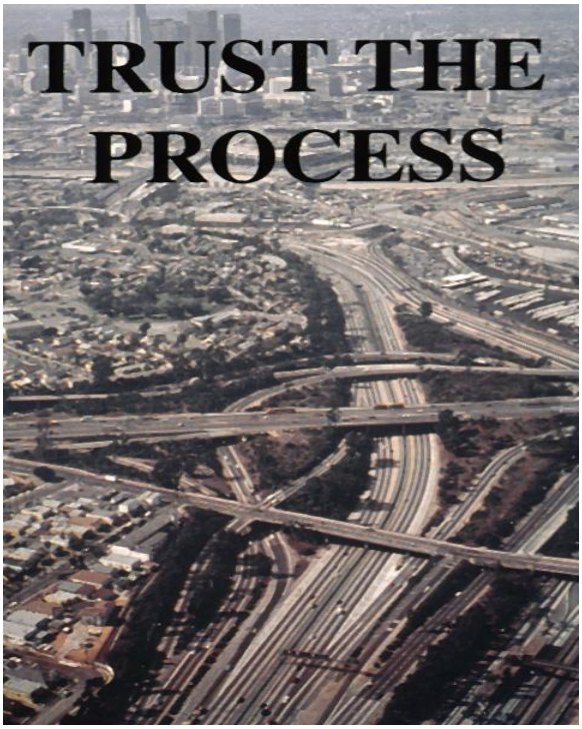
Impact of a New Bundle/2 State Collaborative

- 38 hospitals, 56 ICU's in 2 states from October 2012 to March 2015
- Evidence based interventions, teamwork & safety culture
- Head-of-bed elevation, use of subglottic secretion drainage endotracheal tubes, oral care, chlorhexidine mouth care, and daily spontaneous awakening and breathing trials.



- VAE: 7.34 to 4.58 cases per 1,000 ventilator-days ($p = 0.007$)
- IVAC 3.15 to 1.56 per 1,000 ventilator days ($p = 0.018$)
- PVAP 1.41 to 0.31 cases per 1,000 ventilator-days ($p = 0.012$)

Rawat N, et al. Crit Care Med, 2017; 45:1208–1215



Non-Vent Pneumonia:
Addressing Risk Factors

Some slides courtesy of Barb Quinn

Build the Will: NV-HAP?

- HAP 1st most common HAI in U.S.
- Increased morbidity → 50% are not discharged home
  - Increased mortality →18%-29%
  - Extended LOS → 4-9 days
  - Increased Cost → $28K to $109K
  - 2x likely for readmission <30 day

Kollef, M.H. et.al. (2005). *Chest.* 128, 3854-3862.
ATS, (2005). *AmJ Respir Crit Care Med.* 171, 388-416.
Lynch (2001) *Chest.* 119, 373S-384S.
Pennsylvania Dept. of Public Health (2010).

Slide courtesy of Barb Quinn

Relative Harm: Most Common HAIs

Type	% Prevalence	% Mortality	Cost
CAUTI	13%	1.5%	$1,108
CLABSI	5-10%	12%	$33,618
SSI	22%	3%	$19,305
HAP	22%	19%	$40,000

Magill SS, et al. New England Journal of Med, 2014;370:1198-208

Current Literature:
NV-HAP is a National Problem in Hospitals

Study	Incidence	Mortality	+LOS	Cost
J. Davis (2012)	5,600 /3 yrs	18.9%	Not queried	$28,000
HCUP National database (P)	2/100 pts	14.5%	4 days	$36,400
Magill et al. CDC (2014)	13% of all HAIs	19%	4-9 days	$40,000
Micek, Chew, Hamptom & Kollef (2016)	Matched controls 174 cases NV-HAP	15.5%vs. 1.6% 8.4 more likely to die	15.9 days vs. 4.4	
See, et al. (2016).	Retrospective review 8 hospitals in PA 2011-2012 VAP excluded 30% of 838 cases reviewed by CDC epidemiologists	30.9%		

Davis, Pt Safety Authority 2012 9(3).
Giuliano,K. et al. (2016) AORN Poster 2016
Magill, S.S. et.al. (2014) NEJM. 370(13), p 1198-1208
Micek, et. al. CHEST 2016 Online first
See, et. al.. ICHE, 37, pp 818-824 doi:10.1017/ice.2016.74

Hospital-Acquired Pneumonia:
Non-Ventilated versus Ventilated Patients in Pennsylvania

Purpose:

- Compare VAP and NV-HAP incidence, outcomes

Methods:

- Pennsylvania Database queried
- All nosocomial pneumonia data sets (2009-2011)

Retrieved on 4/24/13 from http://patientsafetyauthority.org/Pages/Default.aspx

Results:

Table 1. Pennsylvania Nosocomial Pneumonia and Related Deaths

YEAR	NO. OF NV-HAP CASES	NO. OF NV-HAP DEATHS	% OF NV-HAP CASES CONTRIBUTING TO DEATH	NO. OF VAP CASES	NO. OF VAP DEATHS	% OF VAP CASES CONTRIBUTING TO DEATH
2009	1,976	363	18.4 (95% CI: 16.5 to 20.3)	922	163	17.7 (95% CI: 15.0 to 20.5)
2010	1,848	366	19.8 (95% CI: 17.8 to 21.8)	737	144	19.5 (95% CI: 16.3 to 22.7)
2011	1,773	315	17.8 (95% CI: 15.8 to 19.7)	640	127	19.8 (95% CI: 16.4 to 23.3)
Total	**5,597**	**1,044**	**18.7 (95% CI: 17.5 to 19.8)**	**2,299**	**434**	**18.9 (95% CI: 17.1 to 20.7)**

Note: NV-HAP refers to nonventilator-hospital-acquired pneumonia and VAP refers to ventilator-associated pneumonia.

- Mortality
- Incidence
- Total deaths
- Total cost
- Wide-spread

Retrieved on 4/24/13 from http://patientsafetyauthority.org/Pages/Default.aspx

NV-HAP SMCS Research Findings: 2010

24,482 patients and 94,247 patient days

Incidence:

- 115 adults
- 62% non-ICU
- 50% surgical
- Average age 66
- Common comorbidities:
  - CAD, COPD, DM, GERD
- Common Risk Factors:
  - Dependent for ADLs (80%)
  - CNS depressant meds (79%)

Cost:

- $4.6 million
- 23 deaths
- Mean Extended LOS 9 days
- 1,035 extra days

Quinn, B. et al. Journal of Nursing Scholarship, 2014. 46(1):11-19

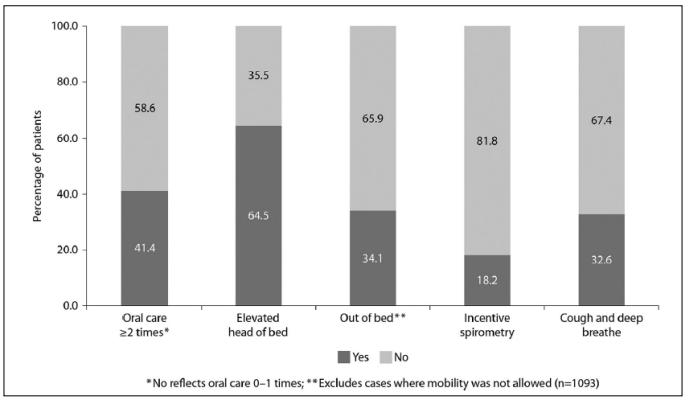
HAPPI-2 Incidence of Non-Ventilator Hospital-Acquired Pneumonia

- Multicenter retrospective chart review
- Extracted NV-HAP cases per the 2014 ICD-9-CM codes for pneumonia not POA and the 2013 CDC case definition
- 21 hospitals completed data collection
- Measured nursing care missed 24hrs before diagnosis
- Non-vent HAP occurred on every unit

Baker D, Quinn B, Amer J of Infect Control, 2018;46:2-7

HAPPI-2 Incidence of Non-Ventilator Hospital-Acquired Pneumonia

Missed nursing care 24 hours prior to Non-Vent HAP dx.



Baker D, Quinn B, Amer J of Infect Control, 2018;46:2-7

HAPPI-2 Incidence of Non-Vent Hospital-Acquired Pneumonia

Results:

- 1,300 NV-HAP (0.12-2.28 per 1,000 pt days)
  - 18.4% mortality
  - 50% < 66 yrs old
  - 63% non-surgical
  - 70.8% outside the ICU
  - 27.3 % in ICU
  - 18.8% transferred to ICU
  - 37.3% LOS >20 days
  - 57.7% LOS > 15 days
  - 40.6% admitted from home were discharged back to home
  - 19.3% readmitted within 30 days
  - $36.4 -$52.56 million in extra costs

Med-Surg (43.1%; n = 560)

Telemetry (8.5%; n = 111)

Progressive (7.2%; n = 93)

Oncology (4.9%; n = 64)

Orthopedic (2.8%; n = 37)

Neurology (1.5%; n = 19)

Obstetric (0.2%; n = 3)

Baker D, Quinn B, Amer J of Infect Control, 2018;46:2-7

Epidemiology of Non-Ventilator Hospital Acquired Pneumonia in US

- The 2012 US national inpatient sample dataset was used to compare an NV-HAP group to 4 additional group cohorts:
  - Pneumonia on admission
  - General hospital admissions
  - Matched on mortality & disease severity
  - Ventilator-associated pneumonia (VAP)
- Secondary outcome: compare HLOS, total hospital charges, and mortality between the NV-HAP group and the 4 l group cohorts

Giuliano K, et al. Am J of Infect Control. 2018;46:322-327

Epidemiology of Non-Ventilator Hospital Acquired Pneumonia in US

- Incidence of NV-HAP was 1.6%, (3.63 per 1,000 pt days)
- NV-HAP was associated with:
  - Increased total hospital charges
  - Longer hospital length of stay
  - Greater likelihood of death

Compared to all groups except patients with VAP

Giuliano K, et al. Am J of Infect Control. 2018;46:322-327

ICU-Acquired Pneumonia VAP vs. NV-HAP

Methods:

- Prospective study of 135 consecutive episodes over 3 years of adults with ICU-acquired pneumonia
- Compared clinical and microbiological characteristics of VAP and NV-HAP

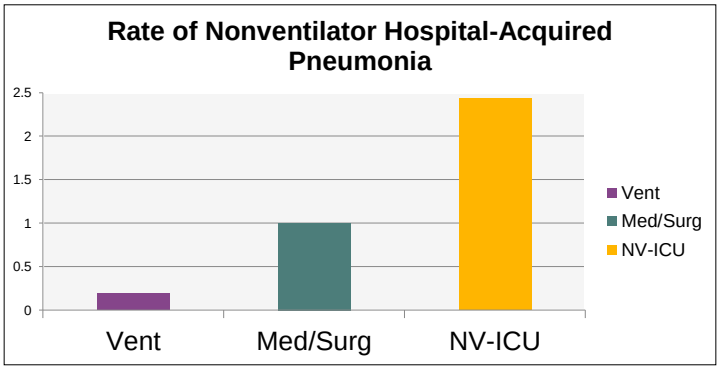
Results for VAP & NV-HAP were not statistically different:

- Pathogens,
- Comorbid conditions,
- Severity parameters,
- Mortality, and
- Hospital length of stay

Among NV-HAP patients, 79 (52%) needed subsequent intubation

Slide courtesy of Barb Quinn

Where is the Highest Risk for NV-HAP?



NV-HAP per 1000 patient days

Slide courtesy of Barb Quinn

Not On Your Dashboard Yet?

Preventing NV-HAP Addresses Common Quality Metrics

• Mortality	18.4%
• ICU utilization	66%
• Length of stay	4-9 extra days
• 30 day Readmission	19.3%
• Long term morbidity	34% d/c LTC
• Sepsis	>50% of all HAP
• Cost	$28K-$40K

Preventing NV-HAP Through Evidence Based Fundamental Nursing Care Strategies

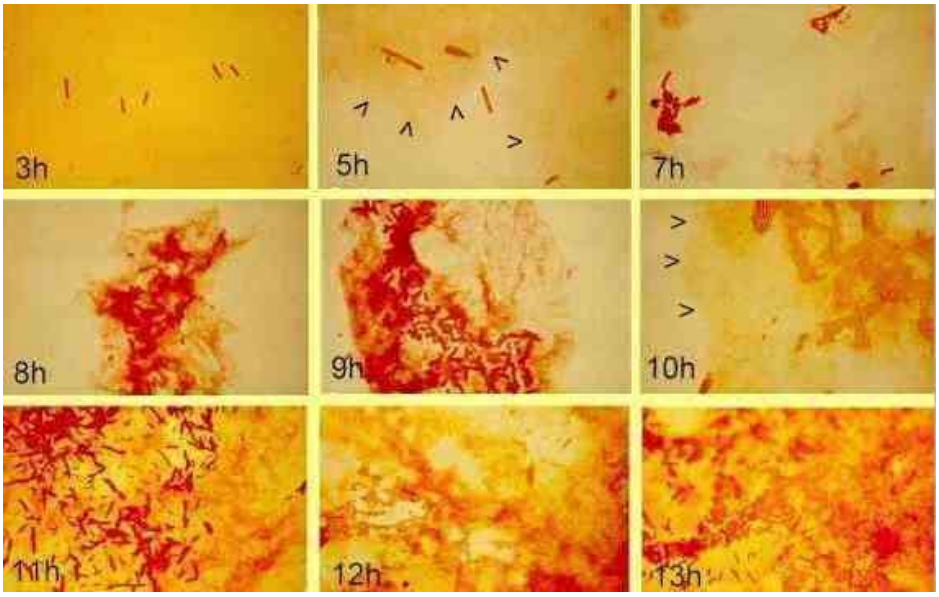
Pathogenesis → Prevention

Germs in Mouth
- Dental plaque provides microhabitat
- Bacteria replicate 5X/24 hrs

Aspirated into Lungs
- Most common route
- 50% of healthy adults micro-aspirate in sleep

Weak Defenses
- Poor cough
- Immunosuppressed
- Multiple co-morbidities

Quinn, B. et al. Journal of Nursing Scholarship, 2014. 46(1):11-19



Loesche, W. 2012
http://helios.bto.ed.ac.uk/bto/microbes/biofilm.htm

Role of Salivary Flow

- Provides mechanical removal of plaque and microorganisms
- Innate & specific immune components (IgA, cortisol, lactoferrin)
- Patients receiving mechanical ventilation have dry mouth which in turn contributes to accumulation of plaque & reduced distribution of salivary immune factors

Munro CL & Grap MJ. AJCC. 2004;13:25-34

Pathogenesis → Prevention

Germs in Mouth
- Dental plaque provides microhabitat
- Bacteria replicate 5X/24 hrs

Aspirated into Lungs
- Most common route
- 50% of healthy adults micro-aspirate in sleep

Weak Defenses
- Poor cough
- Immunosuppressed
- Multiple co-morbidities

Quinn, B. et al. Journal of Nursing Scholarship, 2014. 46(1):11-19

Micro-Aspiration During Sleep in Healthy Subjects

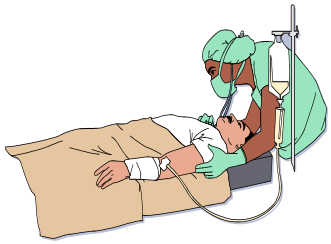
- Prospective duplicate full-night studies
- 10 normal males 22-55 yrs of age
- Methods:
  - Radioactive 99mTc tracer inserted into the nasopharynx
  - Lung scans conducted immediately following final awakening
  - No difference in sleep efficacy between 2 study nights
- Results:
  - 50% of subjects had tracer in the pulmonary parenchyma upon final awakening
  - No difference in age, time spent in bed, efficacy of sleep, apnea-hyponea index, arousal plus awakening index or % sleep in the supine position between subjects that aspirated and those that did not

Gleeson K, et al. Chest. 1997;111:1266-72

Body Position:
Supine versus Semi-recumbent (30-45 degrees)

Methodology

- 19 mechanically ventilated patients
- 2 period crossover trial
- Study supine and semirecumbent positions over 2 days
- Labeled gastric contents (Tc 99m sulphur colloid)
- Measured q 30 min content of gastric secretions in endobronchial tree in each position
- Sampled ET secretions, gastric juice & pharyngeal contents for bacteria



Torres A et. al Ann Intern Med 1992;116:540-543

Body Position:
Supine versus Semi-recumbent (30-45 degrees)

Results

- Radioactive contents higher in endobronchial secretions in supine patients
- Time dependent:
  - Supine: 298cpm/30min vs. 2592cpm/300min
  - HOB: 103cpm/30min vs. 216cpm/300min
- Same microbes cultured in all 3 areas 32% with HOB vs. 68% supine

Torres A et. al. Ann Intern Med 1992;116:540- 543

Missed Nursing Care

- "Any aspect of required patient care that is omitted (either in part or whole) or significantly delayed."
- A predictor of patient outcomes
- Measures the process of nursing care

Kalish, R. et al. (2012) Am Jour Med Quality, 26(4), 291-299.

Hospital Variation in Missed Nursing Care

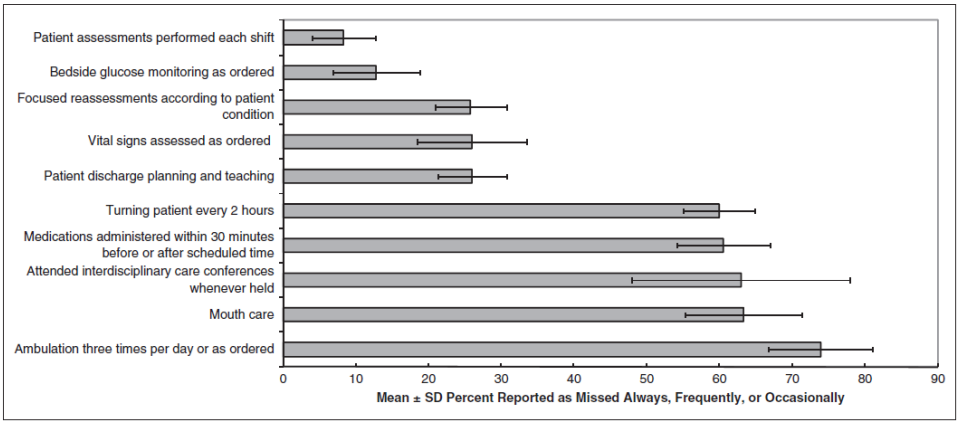


Figure 2. Elements of care most and least frequently missed. The solid bars represent the means across all 10 hospitals, and the range lines indicate the standard deviations.

Kalish, R. et al. (2012) Am Jour Med Quality, 26(4), 291-299.

Patient Perceptions of Missed Nursing Care

Table 2. Elements of Nursing Care by Ability of Patient to Report and Extent Missed*

	Fully Reportable	Partially Reportable	Not Reportable
			■ Patient assessment ■ Surveillance ■ IV site care
Frequently Missed	■ Mouth care ■ Listening ■ Being kept informed	■ Ambulation ■ Discharge planning ■ Patient education	
Sometimes Missed	■ Response to call lights ■ Response to alarms ■ Meal assistance ■ Pain medication and follow-up	■ Medication administration ■ Repositioning	
Rarely Missed	■ Bathing	■ Vital signs ■ Hand washing	

* IV, intravenous.

Kalish, R. et al. (2012) Am Jour Med Quality, 26(4), 291-299.

AACN Procedural Manual-7th ed

Procedure 4: Endotracheal Tube Care and Oral Care

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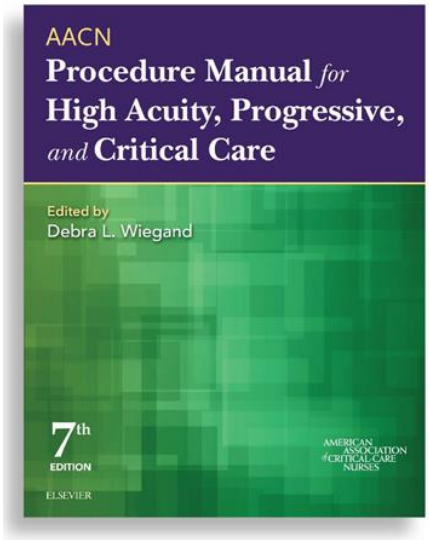
Mary Lou Sole
Barbara Quinn



Risk Factors for Oral Bacteria in the Hospital

- Poor oral health in the U.S. (CDC, 2011)
- Increased bacteria counts
  - Plaque, gingivitis, tooth decay
  - Reduced salivary flow
- 24-48 hours for HAP pathogens in mouth
- If aspirated =100,000,000 bacteria/ml saliva into lungs

Langmore, S. et.al. (1998). Predictors of aspiration pneumonia: how important is dysphagia? *Dysphagia. 13,* 69-81.
Scannapieco FA, Stewart EM, Mylotte JM. *Crit Care Med. 1992;20:740-745.*

Impact of Oral Care on HAP

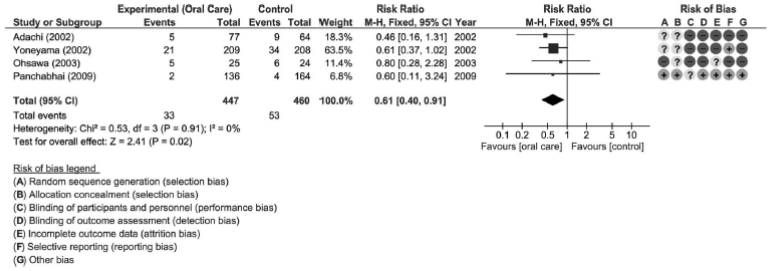


FIGURE 2. Effects of oral care on preventing non–ventilator-associated pneumonia (non-VAP).

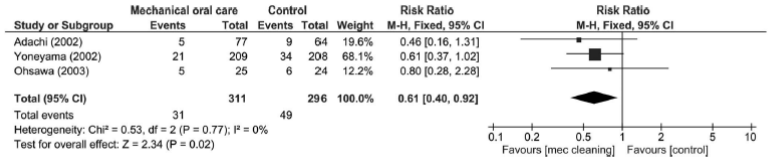


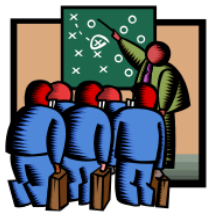
FIGURE 3. The effect of mechanical oral care on non–ventilator-associated pneumonia (non-VAP).

Kaneoka A, et al Infect. Control Hosp. Epidemiol, 2015;36(8):899-906

SMCS HAP Prevention Plan

Phase 1: Oral Care

- Formation of new quality team: Hospital-Acquired Pneumonia Prevention Initiative (HAPPI)
- New oral care protocol to include non-ventilated patients
- New oral care products and equipment for all patients
- Staff education and in-services on products
- Ongoing monitoring and measurement
  - Monthly audits



Quinn B, et al. J of Nursing Scholarship, 2014, 46(1):11-19

Use of the Influencer Model

Influencer Model www.Vitalsmarts.com	Motivation	Ability
Personal	Patient stories	Education
Social	Compare units	Mentor peers
Structural	Measure Recognize	Tools

Gap Analysis

Best Practice	Our Gaps	Action To Take
Comprehensive oral care for all (CDC, SHEA)	ICU vent patients only	Develop inclusive oral care protocol
Oral CHG (0.12%) periop adult CV surgery and vent pts. (CDC, ATS, IHI)	Not using CHG on these patients	Added to preprinted orders, and to protocol
Therapeutic oral care tools (ADA)	Poor quality oral care tools; Absence of denture care supplies	New tools and supplies.

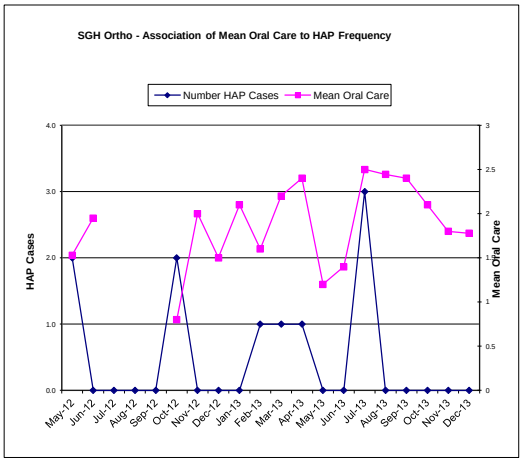
Quinn, B. et al. Journal of Nursing Scholarship, 2014. 46(1):11-19

Protocol – Plain & Simple

Patient Type	Tools	Procedure	Frequency
Self Care / Assist	Brush, paste, rinse, moisturizer	Provide tools Brush 1-2 minutes Rinse	4X / day
Dependent / Aspiration Risk	Suction toothbrush kit (4)	Package instructions	4X / day
Dependent / Vent	ICU Suction toothbrush kit (6)	Package instructions	6X / day
Dentures	Tools + Cleanser Adhesive	Remove dentures & soak Brush gums, mouth Rinse	4X / day

Quinn, B. et al. Journal of Nursing Scholarship, 2014. 46(1):11-19

Provide Meaningful Data



- Ortho Unit had ZERO HAP cases in the last 4 months of 2013!!
- Great WORK!!
- Remember, the goal is to provide and document oral care after each meal and before bedtime.

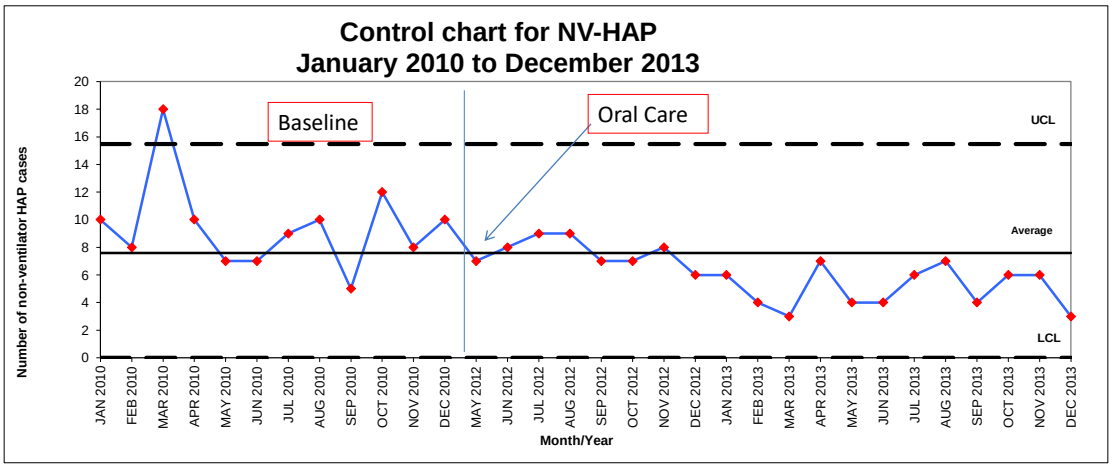
Used with permission from Barbara Quinn

Oral Care Knowledge & Attitude Survey:

- Method:
  - Staff survey
  - Pre – Post education
- Results:
  - Awareness of oral care protocol (77%)
  - Priority of care for NAs (96%)
  - RN perception that their patients received oral care (300%)

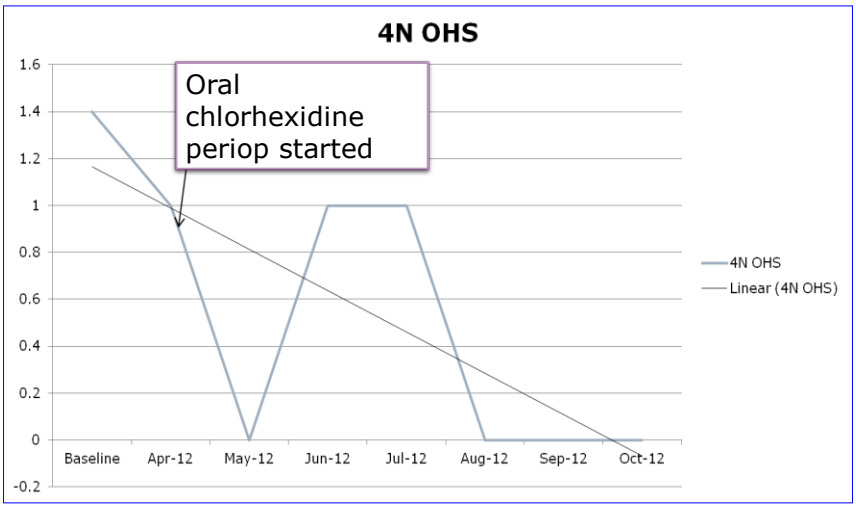
Quinn, B. et al. Journal of Nursing Scholarship, 2014. 46(1):11-19

NV-HAP Incidence
50 % Decrease from Baseline



Quinn, B. et al. Journal of Nursing Scholarship, 2014. 46(1):11-19

Open Heart Surgery Patients: NV-HAP Reduced 75%



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Return on Investment

- 60 NV-HAP avoided Jan 1 – Dec. 31 2013

  $2,400,000 cost avoided

  - 117,600 cost increase for supplies

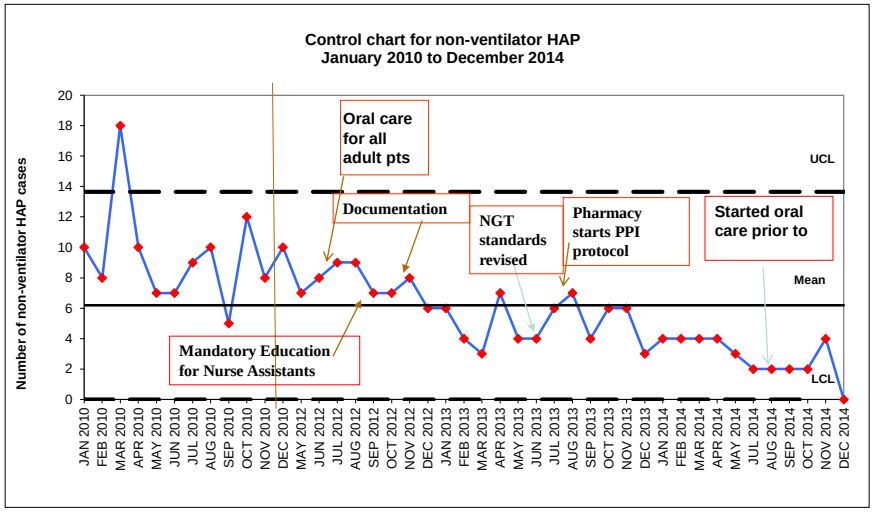
  $2,282,400 return on investment

8 lives saved

PRICELESS

Quinn, B. et al. Journal of Nursing Scholarship, 2014. 46(1):11-19

NV-HAP ↓ 70% from baseline!



Quinn B, Presented at AACN NTI, Houston, Tx, 2017

Post-Operative NV-HAP (all adult inpatient surgery) Incidence 6 months Pre Oral Care vs. 6 Months After

Quinn B, Presented at AACN NTI, Houston, Tx, 2017

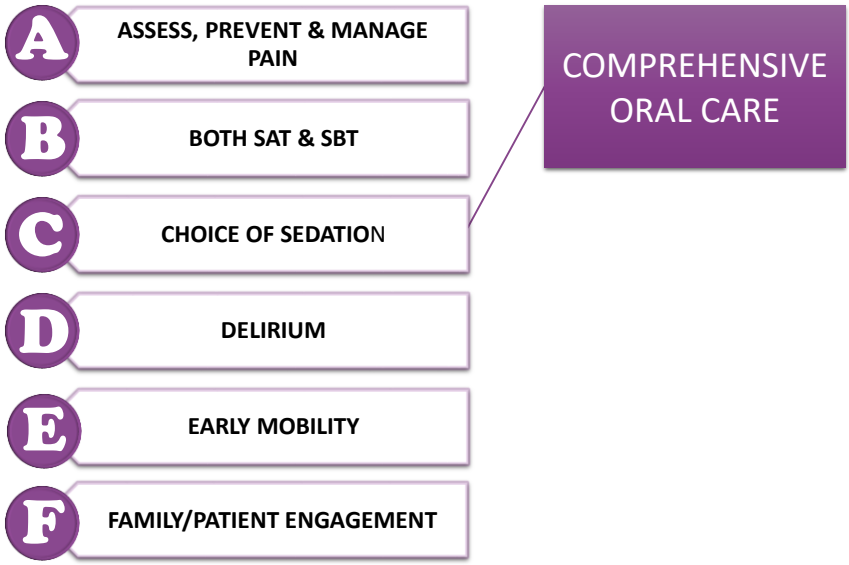
Building Blocks to Best Practice in Caring for Mechanically Ventilated Patients

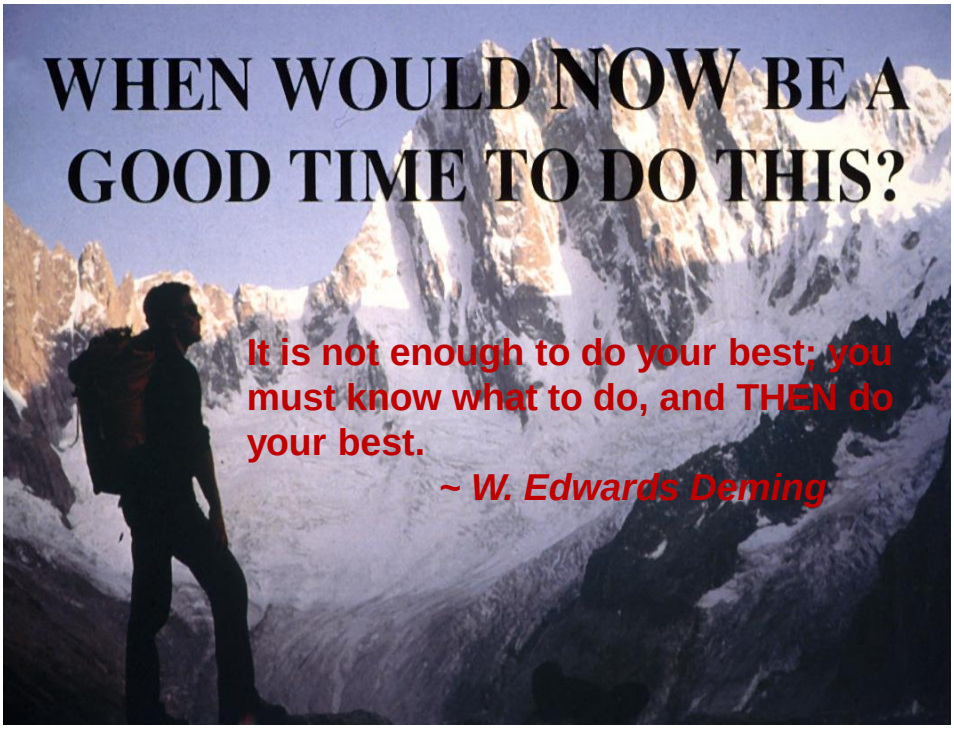
Ventilator Bundle: HOB 30, Deep Vein Thrombosis (DVT) prophylaxis, Peptic Ulcer Disease (PUD) prophylaxis, Sedation interruption, Spontaneous breathing trial, daily care with chlorhexidine

VAP Bundle: HOB 30, Sedation interruption, Spontaneous breathing trial, oral care 6x per day, CHG rinse 2x per day, subglottic secretions drainage if expected to be ventilated > 72hrs

ABCDE Bundle: Assess & manage pain, Both Spontaneous awakening trial (SAT) & spontaneous Breathing trial(SBT), Choice of Sedation, Delirium Assessment and management, Early Mobility, Family and Patient Engagement

http://www.ihi.org/resources/Pages/Tools/HowtoGuidePreventVAP.aspx
www.ICUliberation.org
Rawat N, et al. Crit Care Med, 2017;45:1208-1215





Be Courageous

We all are responsible for the safety of our patients……Own the Issues

"If not this, then what?"
"If not now, then when?"
"If not me, then who?"